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Progress in Medical Training and Research in the U. S. S. R.: AMBASSADOR ALEXANDER A. TROYANOVSKY 137

Obituary:
Benjamin Lincoln Robinson: DR. E. D. MERRILL. *Recent Deaths. Memorials* 142

Scientific Events:
An Oxford Expedition; Expeditions of the Academy of Natural Sciences of Philadelphia; Members of the Water Resources Committee; The Norwich Meeting of the British Association for the Advancement of Science; The Woods Hole Meeting of the Genetics Society of America 144

Scientific Notes and News 147

Discussion:
Synchronous Flashing of Fireflies: DR. HUGH M. SMITH. *A Case for Priority in Botanical Nomenclature:* DR. WILLIAM W. DIEHL. *Acuity of Hearing:* DR. DONALD A. LAIRD. *Tetrapods in the Dunkard Series:* J. J. BURKE. *Nomenclature of Corpus luteum Hormone:* W. M. ALLEN, A. BUTENANDT, G. W. CORNER and K. H. SLOTTA 151

Societies and Meetings:
The International Congress of Physiology in Leningrad: WALTER DURANTY 153

Special Articles:
Crystalline Progestin and Inhibition of Uterine Motility in Vivo: DR. WILLARD M. ALLEN and PROFESSOR SAMUEL R. M. REYNOLDS. *A Colloidal Dye Effective in Treating Pernicious Anemia and Evoking Reticulocytosis in Guinea Pigs:* CAMILLE MERMOD and DR. WILLIAM DOCK. *Deuterium as an Indicator in the Study of Intermediary Metabolism:* DR. RUDOLPH SCHOENHEIMER and DR. DAVID RITTENBERG 155

Scientific Apparatus and Laboratory Methods:
A Biological Effect of Ionized Air: DR. C. T. CHASE and DR. C. H. WILLEY. *Applications of Pervaporation:* DR. LIONEL FARBER 157

Science News 6

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PROGRESS IN MEDICAL TRAINING AND RESEARCH IN THE U. S. S. R.[1]

By ALEXANDER A. TROYANOVSKY

AMBASSADOR EXTRAORDINARY AND MINISTER PLENIPOTENTIARY OF THE UNION OF SOVIET SOCIALIST REPUBLICS TO THE UNITED STATES OF AMERICA

I HESITATE somewhat in presenting a subject in which I am not a specialist before a distinguished group of this kind, and I am sure you will not expect me to have mastered the tongue-twisting words which are in common usage in a discussion among members of the medical profession. I must therefore confine myself to a somewhat general presentation of the progress of medical work in the Soviet Union. In my country the problems of the health and well-being of the community are so integral a part of our whole program, however, so much attention is devoted to them in our press, in our meetings and congresses, in our whole planning program, that the layman can not escape being in constant touch with the activities in the field. In my own work I have thus had the opportunity to become somewhat familiar with medical problems in the Soviet Union.

In the effort to establish social conditions that will make for a healthier citizenry I am sure we have a common ground of interest and can find a common vocabulary. In the field in which I am now functioning, in the field of helping to establish peaceful relations among all the nations, and in particular of helping to strengthen the bonds of friendship and mutual help between your great country and the Soviet Union, I am sure we also speak the same language. In the attempt to find a way of wiping out the disease of war, of replacing it by peaceful cooperation among the

[1] Presented on June 26, 1935, before the Section on Medical and Biological Sciences of the American-Russian Institute of Chicago. A. J. Carlson, Chairman of the Section; B. S. Levine, Secretary of the Section; Wm. H. Walsh, Executive Secretary of the Institute.

peoples of the world, I am sure we have the same goal and the same tongue.

To understand the problems and shortcomings and at the same time to appreciate the progress of the socialized medical service that exists to-day in the Soviet Union, it must be considered against the background of what was handed down to us from the Tsarist régime. I do not intend to burden you with the details of that background—merely to remind you of the terrific annual toll exacted from the population of Russia by social, epidemic and other diseases, the debilitating effect on whole areas of such scourges as trachoma and malaria and in general the abnormally high morbidity and mortality rate, due to the wide-spread illiteracy and poverty of the population and the unbelievably inadequate medical care provided for them.

In spite of this background and the further damage to the health of the nation resulting from the years of war and the famine of 1921, the general mortality rate has been reduced by one third and the infant mortality rate has been halved since the revolution, and our population has increased by about 30,000,000 since 1918.

In all Russia there were less than 20,000 doctors in 1913, so there were vast areas left to the mercy of the overworked, poorly trained feldchers or without any medical help whatsoever. Last year we had over 80,000 doctors in the Soviet Union, four times as many as before, but still far from enough. To train even this many doctors quickly before we really had adequate facilities has meant a certain sacrifice in the quality of the training. We have now reached a point however, in view of steadily improving economic conditions and organization of our public health service, where we can turn our attention to the problem of not merely increasing still further facilities for medical education, but of turning out far better-trained physicians.

Before reviewing recent steps that have been taken in this direction it might be well to touch briefly on the organization of medical work in my country.

While there is a unified program of health service for the whole Soviet Union, each of the seven constituent republics has its own independent Commissariat for Health. The Commissariat for the RSFSR quite naturally serves as a model for the others, and Gregory Kaminsky, who is the Commissar for Health of the RSFSR, holds the post of general sanitary inspector for the whole Soviet Union, which means that assistance and information from Moscow are always at the disposal of each republic and that certain sanitary standards are obligatory for the whole country. But there is no federal health body, since the health of the population is considered one of the cultural matters in which the various national groups have a large degree of autonomy and the type of health service varies considerably in different sections of the country—in certain primitive Asiatic sections, for example, where it is necessary to teach the use of soap, and among the tribes of the Far North which still believe in their medicine men. The health commissariats have their branches throughout the country in places corresponding to the political divisions, down to the local soviets. The Soviets of the republics, regions, cities, districts, all have health sections through whom local problems are coordinated with the general program. The Commissariats of Health have supervision over all matters in any way concerned with the health of the population. Even the medical schools and colleges are under their control. Only the railroads and the army, for administrative reasons, have independent health service. We believe that the care of the health of our people is as much the responsibility of the state as education.

Over 90 per cent. of the physicians in the USSR are regularly employed in state institutions—in the hospitals, polyclinics, dispensaries, factory and district health stations and so on that make up the public health system. They are paid regular salaries and their patients receive free treatment. The usual time they are required to give in their official job is from 3½ to 6 hours, and the aim is that they should not receive more than six patients on the average in an hour. In their outside time they may, if they wish, treat private patients and receive fees. However, practically the entire population has its health needs taken care of through the wide-spread social insurance system, which is a charge on the place of work, not on the individual. More usual than for the physician to have outside private practice has been the holding of more than one position. This has come about both as a result of the shortage of physicians and of the inadequate salaries formerly paid. This, however, has recently been prohibited except in special cases by government decree.

At our Congress of Soviets held in January the medical situation was thoroughly discussed, instructions were drawn up for specific improvements, and it was voted to appropriate exactly twice the sum for public health in 1935 as was spent in the preceding year. One of the first steps in the direction of carrying out the resolutions of the congress was a decree issued in March providing for greatly improved material conditions for doctors and medical workers. Salaries have been almost doubled for large sections of doctors specializing in various fields.

In considering the organization of Soviet medicine it must be kept in mind that there is no separation, such as exists elsewhere, between the administration

of public health and the administration of medical service, and no separation between curative and preventive medicine. The state considers itself responsible for the health of each individual and for the whole community, both from the point of view of insuring greater efficiency of its citizens as workers and from the point of view of providing that richer and more joyous life for every one which is its ultimate goal. The Soviet doctor, removed from the field of monetary competition and from the necessity of collecting fees from individuals, is expected to and is free to concern himself not merely with curing existing ills, but with searching out and abolishing their causes, with keeping the whole community well.

The special type of institution being developed to carry out this program is known as the "unified polyclinic." In the regular health system there are of course the general and specialized dispensaries and hospitals, the "mothers' and babies' centers," the venereal and tuberculosis centers, the factory and district health stations, numerous sanatoria, and so on. But this new type of institution is developing in all the larger centers and bids fair to be the main type of health institution of the future. These centers are well staffed with diagnosticians and specialists in the chief branches of medicine and actually take over the supervision of the health problems of an entire district. They are supposed to locate foci of morbidity and industrial causes of disease and carry out the necessary prophylactic measures. They are responsible for inspection of homes, food and water supply as well as the medical treatment of the individual and his health education, and for healthy conditions of work in the factory or industrial establishment.

The unit of attention is not only the individual, but also the family, for the health problem of the patient is assumed to be tied up with the health problem of the family, with work and food and living conditions, types of amusement and the health of neighbors, too. Further, every patient on first applying must be exhaustively overhauled, passing through all the departments. Complete records are kept both of the patients and of general conditions, and experience and knowledge shared in periodical conferences with similar institutions.

The concentration of medical practice in such centers as well as in the less comprehensive dispensaries and the large hospital units and sanatoria makes it possible for all Soviet doctors to work not as isolated units but in constant contact with a group of doctors and in this way to keep in regular touch with every branch of the medical profession. This goes a long way to offset the over-specialization which has been one of the faults of our medical training and which we are now trying to overcome.

An interesting development is the night sanatorium, where workers with a tendency to tuberculosis or some other incipient trouble may go for definite periods to be built up by special care and diet under medical supervision while still on their jobs. Similarly, "day prophylactoria" are provided for school children who need special care. We are also endeavoring to provide more efficient health service in all village districts and to build up similar organizations there.

Since it is axiomatic that the basis of health is laid in infancy, our first attention has always been for the care of mothers and children. Our labor laws safeguard women in active life from overstrain during the period of pregnancy and young motherhood and our maternity centers provide medical assistance and instruction throughout the whole period of gestation and infancy. Our aim is to have confinement take place in hospitals wherever possible.

Abortions, as you know, have been legalized in the Soviet Union, a step we found essential in order to combat the high mortality resulting from having the operation performed illegally and under unsanitary conditions. Abortions may be performed only by certain authorized physicians and under hospital conditions. At the same time, there has been wide propaganda against them, and our doctors have always urged women not to have recourse to abortions unless absolutely necessary. Contraceptive knowledge and materials have been made freely available through clinics as a preferable method of family limitation.

There has been a good deal printed in the American press of late to the effect that some extraordinary change has recently taken place in the Soviet attitude toward family life. This is an exaggeration of the situation.

Our laws have always provided that a man and a woman need not continue to be married and live together against their will, and that their domestic arrangements were primarily a matter of their individual concern. Our regulations are most stringent about parental responsibility for the children. While the receiving of divorce is a simple process, every effort is made to discourage an irresponsible attitude toward the marriage relationship.

Turning now to the question of medical training, the first improvement to be noted is in the general educational preparation of our medical students. During the period of experimentation in our schools our students often entered the higher educational institutions ill prepared in certain basic subjects. The more systematic training that has been introduced in our lower schools in the past few years has had its immediate reflection in the work of our newly enrolled medical students. There was a tendency for students to select

specialties too early, but gradually this situation has been vastly improved.

It is our plan that eventually all young people shall complete ten years of general schooling before undertaking any specialization at all. Since our country is still handicapped by lack of sufficient skilled workers and technicians in every field, we have had to make a temporary arrangement for specialization in certain cases after the seventh year. For this purpose we have developed the "technicum," a sort of technical or professional high school. In the medical field there are in the RSFSR alone over 150 of these technicums attended by about 40,000 students who are trained for the less highly skilled posts in the medical profession —as assistants, technicians, inspectors, nurses. In the technicums, as in all Soviet schools, theoretical and practical work are closely combined. The technicums are usually connected directly with some medical institution where the students do regular practical work in connection with their studies. Regular jobs are found for technicum students immediately after graduation. Those showing special aptitudes may, of course, go on to the medical colleges or scientific research institutes, but they are required to do a practical job for a specified period first. They may also take courses equivalent to college medical courses while continuing their practical work.

Our medical colleges and institutes, which are receiving particular attention now, have a five-year course and may be entered on completion of ten years of regular schooling. Students are carefully chosen by a special commission on the basis of examinations. They receive government stipends which cover all their expenses throughout the entire course. It may be said that the standards of medical education which we inherited from the old régime were good, but facilities were extremely limited. There were only 13 medical colleges in 1913 in all Russia. In 1934 there were already 36 medical colleges in the USSR, with an enrolment of 48,000. They are situated in all parts of the country, not only in Moscow, Leningrad, Kharkov and the other larger cities but in the North Caucasus, Central Asia, Eastern Siberia, Kazakstan and Far Eastern Region.

Certain highly important changes in our system of medical education have been introduced in our medical colleges during the past year on the basis of a governmental decree issued at the beginning of the school term. The decree emphasized that too much attention had been given in recent years to the training of medical specialists in the field of public hygiene at the expense of the curative and prophylactic field and, chiefly, that there was too little time devoted to general medical knowledge.

Accordingly, the decree provides for the establishment in all the medical institutes of the USSR of faculties for the teaching of curative medicine, which only in the fifth year shall be divided into specialized courses in therapeutics, surgery, obstetrics and gynecology. Faculties for training pediatrists are to be established in fourteen of the medical colleges. Faculties for training in sanitation, bacteriology and epidemiology and food hygiene are to be established in ten medical colleges, with specialization in one of these branches to begin only in the fifth year. Previously each medical college had three separate faculties—one for general curative and prophylactic medicine, surgery and dentistry, one for public health, sanitation and food hygiene, and one for obstetrics, gynecology and pediatrics. The student could choose one of these to the exclusion of the others. Under the new system this arrangement of separate faculties is permitted only in certain of the colleges, and the number of students enrolling in the special faculties is strictly limited. Thus 75 per cent. of the students will be enrolled in the curative faculties, 15 per cent. in the special pediatrics faculties and 10 per cent. in the special sanitation and hygiene faculties. But for the first two and a half years students in all the faculties will receive the same general theoretical training. Students of the faculty of curative medicine may specialize after they have completed the five-year course by serving as internes in the clinics of the institutes for advanced training, medical institutes or hospitals.

The decree also outlines a plan for progressively increasing the number of medical students enrolled each year from 15,610 in the fall of 1934 to 103,610 in 1937. This program is a definite part of our second five-year plan and subject to as strict fulfilment as are our schedules for production of heavy industry, consumers' goods, and so on. It is based on careful calculations of our material and human resources and on the expected progress from year to year.

In general, it should be noted that in our medical training practical work is combined with theoretical work every step of the way. During the first year the student assists in minor medical and surgical cases, during the second, does actual nursing, and during the last three years, practical medical work in hospitals, polyclinics and dispensaries. Before graduation all students are required to complete a "diploma project." A special period is allotted for this, after the completion of the regular course. For this purpose the students are allowed at least two months free of all other work. The project consists of an analysis of clinical material gathered by the student in whatever special field he chooses and a correlation of the student's own observations with the theoretical training received. The material must be prepared in literary form and illustrated with appropriate charts and dia-

grams. Arrangements are made for the student to receive regular assistance and advice from a professor of the faculty under which he has been studying and to accompany the professor on his rounds. Professors, incidentally, are usually engaged in active work. When the project is completed, the student is required to make a report on his findings before a special commission. Examinations are held by state boards appointed by the various Commissariats for Health, and licenses to practice or to carry on further scientific work issued on the results.

In order that all physicians should continue the regular study of modern developments in the field of medical science and keep constantly abreast of the latest achievements in their particular field, we require that physicians, in the centers where there are facilities, take periodic courses to brush up their knowledge while continuing their regular work, and that doctors in the rural sections or remote parts of the country return to the city to take special courses every three years. For this purpose there exists in Moscow a "Central Institute for Advanced Training of Physicians" with courses covering fifty specialties, and such institutes are being established at central points all over the country. The regular salary of the physician is paid to his family during this period; he himself receives a stipend for his expenses, and his transportation and room rent are provided for by the state. Attendance at lectures is required, and examinations are held at the end of the course. On graduation, young doctors are usually sent for three years' practical training in the province, on completion of which they come back for several months at the institute before entering upon their regular jobs. Thousands of doctors have already received training at these institutes, and it has now been made obligatory for every member of the medical profession to attend them.

In the field of scientific research in medical problems the tendency is wherever possible to apply scientific research to our practical needs. Which is not to say that purely scientific problems are neglected. Indeed, we make every effort to provide the necessary facilities for those medical scientists who prefer to work along purely theoretical lines. Every branch of our public health service has a scientific research institute to guide its practical work. Graduates of the medical colleges may enter these institutes to carry on postgraduate work. There are now over 250 of these scientific research institutes throughout the Soviet Union and there are also scientific research departments for graduate work in most of the medical colleges. The necessity of bringing the scientific research institutes and the colleges into closer contact is a problem we are now working on.

These institutes not only give advice and assistance on practical problems, but in many cases actually direct and organize the work. Thus the Tropical Diseases Institute not only carries on intensive research into the origin and cure of all forms of tropical disease, but actually directs the anti-malaria campaigns. In the past few years great advances have been made in fighting the malaria mosquito and its larvae by chemical means with the help of airplanes. The Central Health and Welfare Institute and its local branches are engaged in actual problems connected with the public health service on the basis of data collected from every part of the country. In it are trained the directing staffs for the public health service. There are micro-biological institutes, which apply their findings in fights against epidemics. The Institute for the Health Protection of Young Children not only carries on scientific research work in connection with the medical and educational problems of early childhood and the treatment of sick children, but actually organizes and supervises a chain of model creches and trains personnel for them. It has a polyclinic for infants staffed with specialists in various fields and a training department for young doctors and nurses specializing in children's diseases. The institute has a scientific research worker, a teacher and physician attached to each district in Moscow to observe and advise on general health conditions for young children.

The State Dermato-Venerealogical Institute has done a great deal to reduce the incidence of venereal disease and assists in the prophylactoria, a special type of home where prostitutes receive medical care and are taught a trade and given an opportunity to earn their living. Recent studies show that whereas in 1914 the number of registered venereal patients per 10,000 of the population was 388.7, the number has been reduced to 73.1 by 1934.

The State Labor Protection Institute has made special studies of occupational diseases and has worked out norms for labor processes that may be performed without injury to the workers' health for incorporation in the labor code. There is a Central Health Resort Institute with a number of branches which has sent out numerous scientific expeditions to determine the exact therapeutic value of the mineral springs, mud lakes, and so on, and the curative effect of climatic conditions on different types of illness.

Chief of the scientific research institutes is the "All-Union Institute of Experimental Medicine." This institute belongs to the group concentrating more fully on purely scientific problems. Since 1917 new sections have been added and large funds assigned for laboratories. This institute was reorganized and transferred to Moscow from Leningrad in 1934. This year its staff has reached 1,500, and includes some of our

foremost scientists, among them Dr. Pavlov, whose work on conditioned reflexes is well known in this country. Dr. Pavlov heads a division of the institute remaining near Leningrad, and a special "Pavlov Biological Station" has been built and equipped for his work. He is in charge of a series of clinics in process of organization dealing with metabolism, internal secretions, infections, neuro-surgery and neuro-psychiatry. He is deeply interested in the problem of applying his findings in the treatment of mental and nervous diseases. The institute as a whole is concerned with the study of all the physiological processes of the human organism in relation to the social environment, the application of the most modern achievements of chemistry and physics to medical and prophylactic work and the extension of experimental research.

There is a Central Scientific Council which coordinates the work of all the scientific research institutes so that the research workers will be kept constantly in touch with what others are doing in their own and related fields, and to insure the immediate application of all discoveries of practical value.

In the interest of furthering scientific interchange among all countries, the Soviet Union takes an active part in international congresses. Last year the International Congress for the Study of Rheumatism was held in Moscow. This August we shall be hosts to the International Physiological Congress. I am glad to say that a large delegation of American physicians and scientists will attend, and I hope that some of you will be among them so that you will be able to observe at first hand the contributions the Soviet Union has been able to make to medical science. You will also have the opportunity to study our health system. Experience has proved that it is well devised, although the defects in its functioning are still numerous and there is much room for improvement.

In closing, I should like to express appreciation on behalf of my country to the American medical profession. We owe much of our progress in medical science to the achievements of America in this field. Our doctors who have visited this country have carried back much valuable information. Your doctors who have visited us have reported accurately and favorably on what they have seen. They have also helped us by their constructive advice. Our health authorities invited them on many occasions to give their frank opinion, and the competent criticism received has been welcomed and highly appreciated. May I express the hope for a greatly increased exchange of medical and scientific knowledge and experience between our countries in the future.

OBITUARY

BENJAMIN LINCOLN ROBINSON

ON July 27 American botany lost one of its eminent contributors and Harvard University lost the last of that older group of men who for many years carried on productive botanical work at Harvard and built solidly and well for the future, when Dr. B. L. Robinson died at his summer home at Jaffrey, New Hampshire, in the seventy-first year of his age. His wife, Margaret Louise Casson Robinson, died three years earlier.

Dr. Robinson was born at Bloomington, Illinois, on November 8, 1864. For a time he attended Williams College, later transferring to Harvard and receiving his B.A. degree from the latter institution in 1887, and his Ph.D. degree from Strassbourg in 1889. In 1890 he became an assistant in the Gray Herbarium and in 1892, after the death of Sereno Watson, was made curator, a position that he retained until his retirement in 1935. He was appointed Asa Gray professor of systematic botany at Harvard in 1900.

From 1892 to 1897 he served as editor of the "Synoptical Flora of North America," a comprehensive work initiated by his predecessors, Asa Gray and Sereno Watson. He also served as editor of *Rhodora* for twenty-nine years. His published papers on the floras of North and South America and the Galapagos Islands form an extensive and important series of contributions to our knowledge of the botany of these regions. For many years he devoted his energies to the study of certain groups of the Compositae, becoming the world authority on the North and South American representatives of the Eupatorieae. He also edited, in association with M. L. Fernald, the seventh edition of Gray's "Manual of Botany," the standard descriptive flora of the northeastern United States.

Dr. Robinson's services to the Gray Herbarium were noteworthy. Its position, as to financial support, at the beginning of his career as curator in 1892, was very anomalous, for it was in no way financed by Harvard College. In 1897 its assured annual income was only about $3,600, scarcely half the amount necessary, even at that time, for bare maintenance. Aided by the visiting committee, Mrs. Gray, friends of Asa Gray, and by various bequests, the invested funds and the reserve were augmented to somewhat over $526,000, a twenty-fold increase, during Dr. Robinson's tenure of office. By 1900 the need of more commodious quarters was evident, and ten years later congestion had become acute. Between the years 1909 and 1915 funds were procured for the construction of the present model, fireproof, herbarium building, with its dust-proof and insect-proof steel cases, and other very mod-

ern equipment, in Dr. Robinson's own terms "setting a new and much-advanced standard for herbarium housing." If it had not been for his disinterested efforts the fate of the Gray Herbarium might easily have been a tragic one, in spite of the fact that its great collections of historical material make it of basic importance to North American botany. No wonder that Dr. Robinson was deeply concerned in planning for the perpetuation of the work of his eminent predecessors, Asa Gray and Sereno Watson, and the maintenance and expansion of work that they initiated.

Dr. Robinson's work received wide recognition in his election to numerous societies at home and abroad. He served as president of the Botanical Society of America in 1900 and as president of the New England Botanical Club from 1906 to 1908. He was a member of the National Academy of Sciences and the American Academy of Arts and Sciences; a foreign member of the Linnaean Society, London, and of the Societas pro Fauna et Flora Fennica; a corresponding member of the Deutsche Botanische Gesellschaft, the Botanischer Verein der Provinz Brandenburg, the Société botanique de Genève, the Institut genevois and the Czechoslovakian botanical society, and an honorary member of the Chilean society of natural history.

Quiet, unassuming, courteous in the extreme, a conscientious and efficient worker, a gentleman in the truest sense of the word, Dr. Robinson will be missed by his colleagues and associates at Harvard, by that large group of botanists who were trained at Cambridge during his long tenure of office, and by that larger group of American and foreign botanists who have had the privilege of working for shorter or longer periods with the treasures of the Gray Herbarium. Under Dr. Robinson's leadership the Gray Herbarium attained a spirit of "Gemütlichkeit" unequalled in any other botanical institution with which I am personally familiar. The loss of his services to botanical science is a heavy one, but he leaves behind him a magnificent record of accomplishment.

E. D. MERRILL

RECENT DEATHS

GEORGE HALL HAMILTON, formerly official astronomer at the Harvard College branch observatory at Mandeville, Jamaica, died on August 6. He was fifty-one years old.

DR. JOHN W. KEEFE, of Providence, R. I., surgeon, a founder of the American College of Surgeons, died on August 4. He was seventy-two years old.

DR. HARRY BELLEVILLE ELSBERG, instructor in surgery in charge of the department of experimental surgery in the New York University Medical School, died on August 10. Dr. Elsberg was forty-two years old.

THE death at the age of seventy-seven years is announced of Professor Edouard Jeanselme, professor emeritus in the faculty of medicine of the University of Paris and dermatologist emeritus at the Hôpital St. Louis. Dr. Jeanselme is known for his work on syphilis and leprosy, and recently for his publications on the history of medicine.

DR. LYDIA RABBINOVITCH KEMPER, for many years director of the Bacteriological Institute of the Moabite Hospital, Berlin, died on August 5 at the age of sixty-four years.

Nature reports the death of Dr. Arthur Bramley, head of the department of pure and applied science at Loughborough College, on July 19, aged fifty-six years; of Sir John MacFarland, chancellor of the University of Melbourne since 1918, a member of the Royal Commission (1899) on Technical Education, Victoria, and of the Government Board (1908) for the Protection of Aborigines, on July 22, aged eighty-four years; and of L. M. Nesbitt, who was awarded the Murchison Grant in 1931 of the Royal Geographical Society for "his difficult journey through the Danakil country of Abyssinia," on July 20, as the result of an aeroplane disaster near the San Bernino Pass, Switzerland.

MEMORIALS

A BRONZE plaque of the late Dr. Aldred S. Warthin was presented to the University of Michigan School of Medicine on June 15 by those who had been connected with the department of pathology when he was director. The memorial hangs in the West Medical Building. Dr. Warthin was associated with the university from his graduation there in 1891 until his death in 1931; since 1903 he had been professor of pathology and director of the pathological laboratory.

BUSTS of Koch and Röntgen were added to the German Museum at Munich, on the occasion of the tenth anniversary of its foundation. The Municipal Moabite Hospital of Berlin has been renamed Robert Koch Hospital on the occasion of the twenty-fifth anniversary of his death.

THE Berlin correspondent of the *Journal* of the American Medical Association writes: "Just as three years ago, in commemoration of the semi-centenary of the discovery of the tubercle bacillus, so now, on May 26, in celebration of the year of Koch's death, special ceremonies were organized, which the minister of the interior and the regional health officers were invited to attend. The memorial address was delivered by Professor Kolle, who was a pupil of Koch and

whose death has since been announced. On this occasion the Robert Koch-Stiftung for the combating of tuberculosis, which had been destroyed by the period of inflation, was reestablished. The new organization, however, will be devoted not only to combating tuberculosis but also to other scientific research for the combating of infectious diseases. Donors of substantial sums may possibly become members of the honorary committee or may be permitted to inscribe their names in the so-called Goldenes Buch. Thus far 100,000 marks ($40,000) has been collected, and further sums are being added from time to time. The basal donation is a gift of a group of Japanese physicians, dating from 1932."

SCIENTIFIC EVENTS

AN OXFORD EXPEDITION

IN the latter part of July the Oxford University Arctic Expedition, 1935–36, arranged under the auspices of the Oxford University Exploration Club, left England to spend fourteen months on the unknown coast of the barren, ice-clad North-East Land. The expedition, according to the London *Times*, consists of the following members: A. R. Glen, glaciologist and leader; Andrew Croft, dog driver and second-in-command; A. Dunlop-Mackenzie, organizer; A. S. T. Godfrey, R.E., surveyor; R. A. Hamilton, physicist; D. B. Keith, ornithologist; R. Moss, physicist; A. B. Whatman, Royal Corps of Signals, wireless; J. W. Wright, surveyor, and Dr. A. Ballantine. The average age of the members is twenty-three years.

Of these, Croft and Godfrey were members of last year's British expedition which sledged across Greenland and southwards along the eastern mountains, while Keith and Wright have been on summer Cambridge Iceland expeditions. Glen was leader of the 1933 Oxford Spitzbergen expedition, and it was while he was in Spitzbergen during the summer of 1934 that the idea of this present expedition was suggested to him by the Swedish explorer, Dr. Ahlmann, of Stockholm. The preparations for the expedition have been decentralized so that each member of the personnel was responsible for some branch of the plans. The University of Oxford, the Royal Society and the Royal Geographical Society have supported the expedition generously, as have various other societies and funds, notably Oxford and Cambridge colleges. The War Office has attached two officers and has lent a great deal of wireless equipment, and scientific equipment has been lent by the Admiralty, the Meteorological Office and the National Physical Laboratory. Moreover, the expedition has been presented by British firms with goods of the estimated value of no less than £2,000.

Although only three expeditions have worked in the interior of North-East Land and although no expedition has yet wintered there, the west coast was surveyed by the Swedish-Norwegian Expedition as long ago as 1899–1901, and as one of their trigonometrical points was near North Cape it is hoped that it will be possible to join the survey to theirs, and continue the theodolite framework eastwards, filling in the detailed topography by plane table. As the coast is open to the full strength of the Polar Sea, there is some danger that a south wind may bring down the pack ice, with heavy pressure near the coast, in which case the party will have to make all speed in running for shelter to one of the small inlets which are often to be found inside the lateral moraines of the glaciers, and which generally give safe landing places.

The sun dips below the horizon for the first time on August 23 and early in September the first of the winter storms may be expected. As two stations are to be maintained on the inland ice over the winter and into the spring of 1936, it is of the utmost importance that these should be established, with full supplies of food, fuel and equipment, by the end of August. One of the stations will be on the summit of the eastern area of inland ice at a height of some 2,600 feet, about 60 miles direct from the base hut, which will be established at Rijps Bay, midway along the north coast of North-East Land, and the other between the higher station and the base, near the edge of the ice cap on one of the glaciers flowing into Dove Bay.

Although every effort will be made to change the personnel periodically at each one of these stations, it is not improbable that the weather may make this impossible. In that event the two men at each station will have to be prepared to spend at least six months by themselves, four months of which will be total darkness, relieved only by moonlight and the periodical displays.

It is expected that the expedition will return to England on *The Polar*, the expedition ship, in September, 1936.

EXPEDITIONS OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THUS far this year the Academy of Natural Sciences of Philadelphia has sponsored twenty-four expeditions for collecting and field work in thirteen foreign countries and various parts of the United States, according to an announcement made by Charles M. B. Cadwalader, managing director. Mr. Cad-

walader states that collections and studies had been made or now are being carried on in Tibet, Western China, Siam, Alaska, Bolivia, Guatemala, Mexico, Panama, Cuba, Jamaica, Newfoundland and Siberia, also in Pennsylvania, New Jersey, New Mexico, Wyoming, Florida, Louisiana and other states.

Of special interest, because of the gorillas and okapis secured for new habitat groups in the museum, are the results of the African expedition headed by George Vanderbilt, of New York, who returned with unusually fine specimens for these exhibits and with large collections of other mammals and birds, insects, fishes and reptiles secured in Kenya, Uganda, the Belgian Congo, French Middle Congo, the Cameroons and the French Sudan. Mr. Vanderbilt was accompanied by James A. G. Rehn, curator of entomology, and Harold T. Green, curator of exhibits.

In western China and eastern Tibet, Brooke Dolan, II, of Philadelphia, now is completing a year's work on his second expedition. With a large caravan of yaks and coolies, Mr. Dolan, whose party includes Ernst Schaefer, of the University of Göttingen, has covered several thousand miles, explored districts hitherto unvisited and has made valuable collections of birds, animals and plants. This work has been made possible largely through the cooperation of the Chinese central government and the courtesy of tribal heads.

Cruising in West Indian waters among the Bahamas and the Virgin Islands on the Diesel ketch *Antares*, Colonel Edwin M. Chance, of Philadelphia, is leading a party that is collecting fishes and making a study of the habits of the swordfish and other large game fish.

In the central highlands of Guatemala Rodolphe M. de Schauensee, curator of birds of the Eastern Hemisphere, spent two months collecting birds, fishes and orchids and studying aquatic life in Lake Atitlan, 5,000 feet above sea level. In Siam where, after his third expedition to that country for the academy, Mr. de Schauensee organized a permanent field staff with headquarters in Bangkok, collecting of general zoological and plant specimens is being continued. This intensive work extends into every part of Siam.

Two expeditions now are in the high plateau of central Mexico, for study and collecting under a grant from the American Philosophical Society. Under Dr. Henry A. Pilsbry, curator of mollusks, search is being made for fossil and present-day snails, while Dr. Francis W. Pennell, curator of botany, is seeking certain species of plants.

In the mountains of Panama, A. J. Drexel Paul, Jr., of Philadelphia, and Dr. Robert K. Enders, professor of zoology at Swarthmore College, are collecting mammals and fishes.

For further additions to the representative collection of birds of Cuba and the West Indies, James Bond, ornithologist, has completed his ninth and tenth expeditions to the Caribbean—one to Jamaica and the other to the Zapata Swamp in Cuba. He also spent several weeks on the Magdalen Islands off the coast of Newfoundland.

In Russia, Dr. Edgar B. Howard, under the joint auspices of the academy and the University Museum, is continuing his search for evidence that the "Folsom men," the earliest inhabitants of North America, crossed into this continent from Siberia by way of Bering Strait some 15,000 years ago.

To continue the search for artifacts and possible skeletal remains by Dr. Howard in New Mexico, Mrs. Richard G. L. Ayer, of the department of vertebrate zoology, is spending several weeks in that state.

On her third expedition to British Columbia Mrs. J. Norman Henry, accompanied by her daughter, Miss Josephine deN. Henry, is collecting plants and minerals in regions hitherto unexplored, and in the northwestern part of the United States Dr. Walter M. Benner, of the department of botany, is spending several weeks in collecting plant specimens.

After seven months in Bolivia, where he made a large collection of birds, M. A. Carriker, Jr., curator of birds of tropical America, has returned with a large group of specimens among which are a number of birds never before recorded in that country. This work was also provided for by a grant from the American Philosophical Society.

Ernest Hemingway, the well-known author, has been making a study of the blue marlin and other large fishes in Cuban waters, carrying on work started last summer when Henry W. Fowler, curator of fishes in the academy, and Charles M. B. Cadwalader cruised with him.

R. R. M. Carpenter, of Wilmington, Del., a trustee of the academy, has returned from an expedition to Alaska, where he sought further facts concerning the so-called blue bear. He collected fine specimens of black bear, and Alaskan brown bear, and also of birds and small mammals.

To collect natural accessories for new habitat groups of wapiti and pronghorn antelope, soon to be installed in the North American Hall of the museum, Harold T. Green, curator of exhibits, is leaving for Wyoming, where he will secure the necessary material in the exact localities in which were secured the specimens to be mounted in the large groups.

Dr. Witmer Stone, vice-president, made a collecting trip to southwestern Louisiana, where he secured a number of birds, fishes, insects and plants, and now is continuing his study of bird migration at Cape May. In New Jersey and eastern Pennsylvania, Bayard

Long, research associate in the department of botany, has made a number of field trips to secure additional specimens for the local herbarium. In Hawaii H. Burrington Baker, research associate in the department of mollusks, is collecting and studying mollusks, and in Natal, Africa, H. W. Bell-Marley continues the collecting of fishes for the academy.

The late Prentiss N. Gray, of New York, a trustee of the academy, who died in a boat explosion early in the year while collecting in Florida with David Newell, secured on that last of a long series of expeditions fine specimens of panther which live in the cypress swamps in that state.

MEMBERS OF THE WATER RESOURCES COMMITTEE

ABEL WOLMAN, chairman of the Maryland Planning Board, has been named chairman of a newly appointed Water Resources Committee, which will deal with PWA projects involving power developments, flood control and the like.

The new committee, of which Harold L. Ickes is chairman, will function as a unit of the National Resources Committee, which last winter submitted a comprehensive report on the development of public lands, forestation, water projects and minerals.

"The committee," according to a statement made by Mr. Ickes, "is engaged in outlining a long-range plan for the more effective use of all the water resources of the nation and for continuance and application of the policies set forth in the report of the Mississippi Valley Committee and the December, 1934, report of the National Resources Committee." Various water projects pending before the Work Relief Administration will be considered by the committee in connection with construction proposals and for collection of basic data.

Other members of the committee are:

Thorndike Saville, of the American Society of Civil Engineers and associate dean of the College of Engineering, New York University.

N. C. Grover, chief hydraulic engineer, water resources branch, U. S. Geological Survey.

Elwood Mead, director of the Bureau of Reclamation.

Jay N. Darling, chief of the Biological Survey.

H. H. Bennett, chief of the Soil Conservation Service.

R. Y. Tarbett, sanitary engineer, of the U. S. Public Health Service.

Major-General Edward M. Markham, chief of the U. S. Army Engineers.

Thomas R. Tate, director of the National Power Survey, Federal Power Commission.

H. H. Barrows, professor of geography at the University of Chicago and formerly a member of the Mississippi Valley Committee and the National Resources Committee.

Edward Hyatt, state engineer, of California.

The new committee will have as an advisory body the former water planning committee which was a unit of the National Resources Committee.

THE NORWICH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE London *Times* reports that arrangements for the meeting at Norwich in September of the British Association for the Advancement of Science are now practically completed. The association has only once before, in 1868, met at Norwich, but it is said that the city and the surrounding country have much to engage the attention of the various sections, and the excursions of the eight-day gathering will be unusually attractive. Norfolk is classical ground for the geologist, there is much to interest the archeologist and the botanist and the county has a special agricultural standing. Prehistoric man, the Gael and the ancient Briton dwelt on the site of Norwich before the Romans built a road through it to serve their settlement at Caistor. The Saxons developed the town and the Normans built the Cathedral and Castle. In the Tudor period, when Flemish and French refugees founded a flourishing textile industry, Norwich came to rank as the second city of the kingdom.

The president of the association this year is Dr. W. W. Watts, emeritus professor of geology at the Imperial College of Science and Technology, South Kensington. His address to the inaugural general meeting on September 4 in the Agricultural Hall will have for its subject "Form, Drift and Rhythm of the Continents."

The list of sectional presidents and the subjects of their addresses were given in the issue of SCIENCE for May 24. Among the matters to be discussed in the Section of Mathematical and Physical Sciences are atomic physics, noise and new stars. The Section of Chemistry will hear papers and discussions on the chemistry of grass crops, surface phenomena and magnetic properties and chemical constitution. The geologists and anthropologists will hold a joint discussion on "Early Man in East Anglia." In Section D—Zoology—there is to be a discussion on the centenary of the landing of Darwin on the Galapagos Islands and the birth of the Darwinian hypothesis of the origin of species. Papers will also be read in this section on "The Problem of the Herring" and animal migration.

The Section of Economic Science and Statistics has an agenda which includes, among other questions, the chronology of the world crisis, economic aspects of diet, population problems since Malthus, problems of amalgamation and decentralization and probable future trends of scientific management in Great Britain. The Sections of Physiology and Psychology will

discuss jointly the subject of hearing and aids to hearing, and the Section of Psychology with the Engineering Section will consider the application of science to traffic problems. Among the questions to come before the Section of Agriculture is that of the result of state control in agriculture. The association service on Sunday, September 8, will be held in the Cathedral, and it is understood that the Bishop of Norwich will preach the sermon.

THE WOODS HOLE MEETING OF THE GENETICS SOCIETY OF AMERICA

THE program of this year's meeting of the Genetics Society of America, to be held on Friday, August 23, and Saturday, August 24, will consist of round table conferences, demonstration papers and exhibits. In addition, a regular Marine Biological Laboratory evening lecture of interest to geneticists will be given during the meeting. Brief formal papers will not be presented. Round table conferences will consist of general discussions dealing with problems of broad interest. Each conference will be in charge of a leader, and the subject will be introduced by two speakers, each taking about 20 minutes. Demonstration papers (with the help of charts and experimental material) will constitute informal presentations of problems. They will be presented at a specified time. Exhibits will represent the material arranged so that it is self-explanatory. They will be open during the whole meeting and may be described during the presentation of demonstration papers. A limited number of microscopes will be available for demonstration and for exhibit purposes.

The Marine Biological Laboratory is offering to the society all available facilities for the meeting. Rooms are available in private houses at prices of approximately $1.00 to $1.50 per day per person, or at special rates per week.

The program follows:

Thursday

8:00 P. M.—M.B.L. evening lecture by Dr. Ralph E. Cleland, Goucher College.

Friday

9:30 A. M.—Round table conference: "How Far Genetics Can Explain Ontogeny." Leader, A. H. Sturtevant; introducers, Curt Stern and J. L. Cartledge.

2:00 P. M.—Demonstration papers and exhibits.

6:00 P. M.—Clam Bake.

Saturday

9:30 A. M.—Round table conference. "Chromosomes and Their Relation to Genes." Leader, E. M. East; introducers, C. B. Bridges and Barbara McClintock.

2:00 P. M.—Demonstration papers and exhibits.

The regular winter meeting of the society will be held with the American Association for the Advancement of Science at St. Louis. At this meeting two round table conferences will be conducted, one dealing with "Species from a Genetic Viewpoint," with L. J. Stadler as leader and Th. Dobzhansky and J. Clausen as introducers, and the other dealing with "Genetics and Plant Breeding," with E. W. Lindstrom as a leader and H. K. Hayes as one of the introducers. In addition to the regular meeting at St. Louis, a branch meeting will be held at Princeton, together with the American Society of Zoologists, in order to accommodate the eastern members who are unable to attend the regular meeting.

SCIENTIFIC NOTES AND NEWS

AT a recent meeting of the board of regents of the University of Michigan the board directed that the following resolutions, adopted by the Faculty of the Medical School, be spread upon the records of the Regents' meeting and that an official copy be furnished to Dr. Novy:

WHEREAS, Dr. Frederick George Novy has completed almost half a century of devoted and loyal service to this University and to our Medical School; and

WHEREAS, During this period of time Dr. Novy has attained an eminent place in science and has through his teaching and character exercised a profound influence in achieving and maintaining the high standards of the Medical School of the University of Michigan, and by his researches has contributed to the great reputation of this among other universities; be it

Resolved, That his colleagues of the Medical Faculty hereby convey to Dr. Novy their sense of deep obligation to him as a colleague and as a man; and be it further

Resolved, That the members of the Medical Faculty make known to the President and to the Regents of the University their great pride in Dr. Novy's achievements and their sincere regret that he will no longer be actively associated with them in the affairs of the Medical School.

DR. GEORGE R. MINOT, professor of medicine and director of the Thorndike Memorial Laboratory of the Boston City Hospital, and Dr. George H. Whipple, professor of pathology and dean of the School of Medicine and Dentistry of the University of Rochester, have been elected members of the Academy of Sciences at Halle.

DR. GEORGE C. SIMPSON, director of the Meteorological Office, London, has been elected a corresponding member of the Göttingen Academy of Sciences in the section for mathematical physics.

THE Emil Fischer Memorial Medal has been

awarded to Dr. Adolf Butenandt, professor of organic chemistry and technology at Danzig.

DR. WALTHER ROTH, professor of chemistry at the University of Braunschweig, has been awarded the Liebig Memorial Medal.

THE University of Dublin on July 5 conferred the following honorary degrees: D.Sc. on Professor Gilbert Thomas Morgan, director of the Chemical Research Laboratory at Teddington; the degree of Litt.D. on Sir Frederic George Kenyon, formerly director of the British Museum, and the degree of M.D. on Thomas Hugh Milroy, professor of physiology in Queen's University, Belfast, and on Sir Norman Walker, direct representative for Scotland on the General Medical Council.

DR. WILLIAM OTIS HOTCHKISS will assume the presidency of the Rensselaer Polytechnic Institute on September 1, succeeding the late Dr. Palmer Chamberlaine Ricketts, who died last December. Dr. Hotchkiss has been for the past ten years president of the Michigan College of Mining and Technology.

DR. NICHOLSON J. EASTMAN, formerly professor of obstetrics and gynecology at the Peiping Union Medical College, China, will assume the post of professor of obstetrics at the Johns Hopkins Medical School and obstetrician-in-chief at the Johns Hopkins Hospital on September 1. He succeeds Dr. John Whitridge Williams, who died in 1931.

DR. SIDNEY M. NEWHALL, a Sterling fellow engaged in research in the Institute of Human Relations of Yale University, will join the faculty of the Johns Hopkins University as a lecturer in the department of psychology.

DR. CHARLES BREASTED has been appointed assistant director of the Oriental Institute of the University of Chicago, of which Professor James H. Breasted is director, and Dr. John A. Wilson, assistant professor of Egyptology and secretary of the department of Oriental languages, has been made scientific secretary of the institute.

DR. WILHELM MAIER, formerly of the University of Frankfurt, for the last three years a member of the department of mathematics at Purdue University, has resigned to join the faculty of the University of Freiburg. Dr. Maier has been spending the summer in Germany.

AT the University of London, the following appointments have been made: Dr. James Whillis, since 1923 lecturer in anatomy at the College of Medicine, Newcastle-on-Tyne, to be reader in anatomy (Guy's Hospital Medical School) as from October 1, and Dr. Jerzy Neyman, since 1927 lecturer in mathematical statistics at the Central College of Agriculture, Warsaw, and also since 1928 head of the Biometric Laboratory, Nencki Institute, Warsaw, to be reader in statistics at University College.

AT the University of Cambridge, G. L. Stagg, Trinity Hall, has been recommended for reappointment to the Joseph Hodges Choate memorial fellowship at Harvard University, and R. A. Lyttleton, Clare College, has been recommended for the Jane Eliza Procter visiting fellowship at Princeton University. The following university demonstrators have been appointed: F. R. Parrington, Sidney Sussex, zoology; Dr. R. Knox, Oxford, and Dr. G. B. McCulloch, Belfast, pathology.

DR. HALBERT L. DUNN, professor of biometry in the University of Minnesota Graduate School of Medicine and director of the University of Minnesota Hospitals, Minneapolis, has resigned to become chief statistician of vital statistics, in the Bureau of the Census.

Industrial and Engineering Chemistry reports that Dr. M. H. Haertel has been elected secretary-treasurer of the Wood Chemical Institute, Inc., which has established headquarters in Washington in the offices formerly occupied by the code authority. In so far as is practical the institute will continue the activities of the authority for the hardwood distillation industry.

THE Committee on Scientific Research of the American Medical Association has made a grant to Dr. Herbert F. Thurston, of Indianapolis, for the investigation of the effects of the x-ray on infections caused by *Bacillus Welchii*. This work will be done in the laboratories of the School of Medicine of Indiana University.

AN Associated Press dispatch reports that Dr. H. E. Hasseltine, senior surgeon of the U. S. Public Health Service, stationed at the Marine Hospital, San Francisco, is seriously ill from psittacosis, contracted while experimenting with serum for its treatment. Dr. Hasseltine recovered from an attack of the disease when working in Washington in 1931.

THE property of Dr. Friedrich Dessauer, formerly professor of physics and director of the Institution for Physical Elements of Medicine at Frankfurt, was recently confiscated by the Prussian State under the law for the seizure of property "inimical to people and state." The property consists of a balance of 41,000 marks at a Frankfurt bank. Dr. Dessauer, who is stated to be now in Constantinople, was a Parliamentary member of the Catholic Center Party and an adviser of Dr. Brüning in economic matters.

DR. JESSE MORE GREENMAN, professor in the Henry Shaw School of Botany of Washington University and

curator of the herbarium of the Missouri Botanical Garden, St. Louis, will attend the sixth International Botanical Congress to be held at Amsterdam, from September 2 to 7, as the official delegate of the Missouri Botanical Garden, the St. Louis Academy of Science and the Illinois State Academy of Science. Dr. Greenman, while in Europe, also will consult the herbaria at Copenhagen, Utrecht and Leyden.

PROFESSOR R. C. FUSON, professor of organic chemistry at the University of Illinois, has been granted a leave of absence for the first semester of 1935–1936. He sailed on August 11 for Europe, where he will visit various laboratories of organic chemistry in Germany, Austria and Italy.

DR. WILLIAM B. PORTER, professor of medicine, Medical College of Virginia, Richmond, is studying for two months in Puerto Rico the adjustment mechanisms occurring in the circulatory apparatus in chronic anemias associated with parasitic infections. He is giving a series of lectures and clinics while on the island.

THE following are official delegates of the United States to the sixth International Botanical Congress at Amsterdam, which will be held from September 2 to 7: Dr. Elmer Drew Merrill, chairman, director in chief of the New York Botanical Garden; Dr. Albert Francis Blakeslee, acting director of the Department of Genetics, Carnegie Institution, Washington, D. C.; Dr. G. H. Coons, principal pathologist, U. S. Department of Agriculture; T. P. Dykstra, assistant pathologist, U. S. Department of Agriculture; Dr. A. S. Hitchcock, principal botanist, U. S. Department of Agriculture; Ellsworth P. Killip, associate curator of plants, U. S. National Museum; Professor Walter F. Loehwing, department of botany, University of Iowa; B. Y. Morrison, principal horticulturist, U. S. Department of Agriculture, and Dr. Neil E. Stevens, senior pathologist, U. S. Department of Agriculture. The headquarters of the delegation will be at the Koloniaal Instituut, Amsterdam.

UNDER the auspices of the Oberländer Trust of the Carl Schurz Memorial Foundation, six foresters sailed on August 3 to study scientific methods in Germany. They plan to spend six months in Germany, Austria and Czecho-Slovakia, each making independently observations in his special field. The members of the group and their fields of inquiry are: W. N. Sparhawk, senior forest economist, U. S. Forest Service, "Social Relationships of Forestry"; L. F. Kneipp, head of the division of land, U. S. Forest Service, "Utilization of Forest for the Local Community"; E. E. Carter, assistant forester in charge of forest management, U. S. Forest Service, "The Economic Basis of Silviculture"; C. L. Forsling, director of the Appalachian Forest Experimental Station, Asheville, N. C., "Technical Aspects of Forest Management, Transportation Systems, etc."; H. L. Shirley, associate silviculturist, Lake State Forest Experiment Station, U. S. Forest Service, St. Paul, Minn., "Seed Problems, Including Seed Certification," and Aldo Leopold, in charge of game research, University of Wisconsin College of Agriculture, "Game Management in Relation to Forestry."

THE twentieth annual meeting of the Optical Society of America will be held at the Franklin Institute, Philadelphia, on October 24, 25 and 26. The museum of the Franklin Institute has an unusually interesting set of exhibits in optics as well as other branches of science and the mechanic arts. Members and their guests registered at the meeting may visit the museum at any time during the meeting. A visit to the Fels Planetarium, which is housed in the same building, is an added attraction. In addition to the usual program of papers contributed by the members on their own initiative, the meeting will include the following special features: (1) A special program of invited papers on the microscope and microscopy and (2) the presentation of the Frederic Ives Medal for 1935 at the annual dinner of the society. Non-members who desire to receive the advance program, final notices or other information in regard to the meeting, should address their requests to L. B. Tuckerman, secretary, Optical Society of America, National Bureau of Standards, Washington, D. C., not later than October 1.

THE 1935 conference on "Cooperative Meat Investigations" was held from July 25 to 27 at Chicago. It was attended by representatives of seventeen state agricultural experiment stations, three bureaus and the Office of Experiment Stations of the U. S. Department of Agriculture, the University of Chicago, and the livestock and meat industry. Officers of the conference were elected as follows: *Chairman,* Dean W. C. Coffey, College of Agriculture, University of Minnesota; *Vice-chairman,* Dr. P. F. Trowbridge, North Dakota Agricultural Experiment Station, Fargo; *Secretary,* Dr. Hugh C. McPhee, chief of the Animal Husbandry Division, Bureau of Animal Industry, U. S. Department of Agriculture.

THE tenth International Congress of the History of Medicine, to be held at Madrid from September 23 to 29, will include, according to *The British Medical Journal,* visits to Toledo, where the congress will be opened by the President of the Spanish Republic, the Escorial, the Silos and Guadalupe monasteries, receptions in Madrid itself, and an exhibition of manuscripts, books and instruments of medico-historical interest. The chair at the scientific meetings will be

taken in succession by Professors A. Capparoni of Padua, A. de Silva Carvalho of Lisbon, Victor Gomoiu of Bucarest, Laignel Lavastine of Paris, Sir Humphry Rolleston, the British delegate, and Professor G. Marañon, the president of the congress. The Royal Society of Medicine will be represented by Dr. J. D. Rolleston and Dr. J. F. Halls Dally, and the University of Edinburgh by Dr. John Comrie.

AN International Congress for the Scientific Study of Population Problems will be held in Berlin from August 26 to September 1, and will deal more particularly with births, racial hygiene and the protection and maintenance of life. Papers will also be read on statistical inquiries; social, economic and psychological topics affecting the community, and general questions relating to medicine, hygiene and anthropology.

THE London *Times* reports that a British Speleological Association was formed at a meeting at Derby on July 27 attended by representatives from the five principal areas in which caves are situated—Yorkshire and Lancashire, Derbyshire and Staffordshire, Somerset, Devon, North and South Wales and Ireland. Professor L. S. Palmer, of Hull University College, who was elected chairman, said that the present state of speleology was not satisfactory, and that it was important that its every phase, whether as a sport or in its hydrological, geological, geographical or biological aspects, should be developed in the best possible way. There was much overlapping and duplication, and such progress was not possible as could be obtained if all the interests were coordinated and all information widely circulated from some central clearing-house. It would be the object of the association to achieve those ends. The decision to inaugurate the association was taken on the motion of E. Simpson, Austwick, Lancaster, seconded by Dr. R. G. S. Hudson, of the University of Leeds. Sir Arthur Keith is to be invited to become president.

THE trustees of the Cranbrook Institute of Science, Bloomfield Hills, Mich., announce eight grants in aid of research, the results of which will be published by the institute. These are: Marjorie T. Bingham, "The Plant Ecology of Oakland County, Michigan" (renewal), $200; Edward T. Boardman, "Cyclic Fluctuations in the Populations of Parasites of Mammals" (renewal), $250; W. H. Burt, "The Resident Birds of Southern Michigan," $300; Robert T. Hatt, "Life History Studies of Local Mammals," $250; Carl L. Hubbs, "Minnows of Southern Michigan," $300; Adolph Murie, "Natural History of the Red Fox in Southern Michigan," $100; George M. Stanley, "The Geology of Oakland County, Mich., and the George Reserve" (renewal), $300, and George M. Sutton, "Studies on the Sparrows of Southern Michigan" (renewal), $300.

NEW YORK UNIVERSITY has since March received for support of work in the Medical College the following gifts: the Carnegie Corporation of New York, $8,750; the Rockefeller Foundation, $1,000 for salaries of visiting teachers; $1,250 for research in neurology under Dr. Foster Kennedy; Georgia Warm Springs Foundation for research on poliomyelitis under Dr. William H. Park; other donors, $2,160.47; Bernard M. Baruch, $3,092.93 for studies on pneumonia under Dr. Milton B. Rosenbluth; International Cancer Research Foundation, $1,500 for research in cancer under Dr. Robert Chambers, Washington Square College, New York University; E. R. Squibb and Sons, $1,250 for a fellowship in the department of surgery, and Mrs. Alfred F. Hess, $1,000 to establish the Alfred F. Hess Nutrition Fund under direction of Dr. Jacques M. Lewis.

THE U. S. Civil Service Commission announces an open competitive examination for the position of chief explosives chemist at a salary of $5,600 a year. At present there is a vacancy in this position in the Bureau of Mines with headquarters at the Pittsburgh Experiment Station, which will be filled as the result of this examination. The work under general administrative direction, with wide latitude for independent or unreviewed action or decision, is to administer and direct the work of the Explosives Division of the Bureau of Mines at the Pittsburgh Experiment Station at Pittsburgh, Pa., and the Explosives Experiment Station at Bruceton, Pa., near Pittsburgh; to plan, carry out and report upon chemical and physical tests of permissibility of commercial explosives for use in mines and quarries, research relating to the safe and efficient use of explosives in the mineral industries, including studies of the mechanism of ignition of gas and dust explosions from the use of explosives and research on the inflammable limits of gases and the ignition and propagation of explosions in gas mixtures. Competitors will not be required to report for examination at any place, but will be rated on their education and experience on a scale of 100, such ratings being based upon competitors' sworn statements in their applications and upon corroborative evidence.

THE Secretary of State for Scotland announces that the office of regius professor of zoology in the University of Glasgow will become vacant on October 1 next owing to the resignation of Professor John Graham Kerr. Applications for the chair, accompanied by two copies of recent testimonials, should be addressed to the Private Secretary, Scottish Office, Whitehall, London.

DISCUSSION

SYNCHRONOUS FLASHING OF FIREFLIES

ANOTHER contribution to the elucidation of this remarkable phenomenon appears in a recent issue of SCIENCE,[1] that being the twentieth article on the subject in the same journal in the last twenty years.

This most recent explanation of the phenomenon is to the effect that a flashing female firefly in the grass attracts a small group of flying males which adjust their flashing period to that of the male which first responds to the flash signal of the female; another female, stimulated by the first flashing group, in turn attracts another coterie of males, which flash in unison with one another and in synchronism with the original group; and so the wave passes from female to female "until a large number of fireflies scattered over an extensive area are flashing in unison." The conclusion of this writer is that "the whole process thus depends on the fact that all the females reply to each of the flashes of the male at the same definite interval."

This explanation, which ascribes the phenomenon to a mating adaptation, may satisfactorily account for the behavior of the particular American species of firefly under observation, but it fails utterly to cover the synchronism in the flashing of fireflies in southeastern Asia, more particularly in Siam, where the phenomenon is exhibited on a vast scale and was witnessed by me very frequently during each of the years 1923–1934. How entirely different are the facts in the two cases may be seen from the following outline of the behavior of fireflies in Siam.

As has been pointed out by Morrison,[2] this phenomenon in Siam at least is unrelated to mating. The males which exhibit synchronous flashing are not in flight but are stationary on the leaves of a single species of tree (*Sonneratia acida*). This tree grows on the edge of streams which may be in flood for protracted periods, so that a tree may stand in several feet of water. When darkness approaches, the males from the adjoining jungle fly to the nearby Sonneratia trees, but during this flight show no synchronism in flashing.

Synchronous flashing occurs hour after hour, night after night for weeks or even months, without regard to air currents, air temperature, moisture or any of the other meteorologic conditions which have been stated to influence firefly flashings; there may be a dead calm, a gentle breeze may be blowing or even a steady wind may prevail. The night may be clear, the sky may be overcast or a light rain may fall without noteworthy effect on the rhythm or intensity of the flashing, but during bright moonlight the phenomenon is practically absent.

No females are observable at any time during the synchronous flashing, and it is obvious that the gathering of the males on a particular kind of tree on the water's edge is unrelated to mating. So far as known, the flightless females remain in the adjacent jungle from which the males have definitely flown for the purpose of engaging in this nightly display.

I consider the synchronous flashing of fireflies in Siam the outstanding zoological phenomenon in a country that abounds in zoological features of great interest. The display may be seen to best advantage along the broad stretch of the Menam Chao Phya which extends between Bangkok and the sea, and it is there that I have taken a number of parties of Americans and Europeans to witness it. Imagine a tree thirty-five to forty feet high thickly covered with small ovate leaves, apparently with a firefly on every leaf and all the fireflies flashing in perfect unison at the rate of about three times in two seconds, the tree being in complete darkness between the flashes. Imagine a dozen such trees standing close together along the river's edge with synchronously flashing fireflies on every leaf. Imagine a tenth of a mile of river front with an unbroken line of Sonneratia trees with fireflies on every leaf flashing in synchronism, the insects on the trees at the ends of the line acting in perfect unison with those between. Then, if one's imagination is sufficiently vivid, he may form some conception of this amazing spectacle. By going out into the river far enough from shore to lose sight of the individual flashes, a person may obtain from a single tree, a group of trees or a long line of trees a weird pulsating mass effect.

Some persons who have never seen the phenomenon and are skeptical in regard to its actuality stress the statement of observers that there may be a few fireflies which flash asynchronously. I have noticed this behavior on several occasions and have collected specimens of the apparently aberrant individuals, which proved to be of different species, easily distinguishable by the different intensity, color and rhythm of their light as well as by anatomical characters.

I am unable to offer any explanation of this phenomenon, and my principal object is to point out the facts as applied to Siam. I may express the opinion that some of the published explanations are more remarkable than the phenomenon itself. Thus, one writer[3] holds that "for such a thing to occur among insects is certainly contrary to all natural laws," and he attributes the phenomenon to the sudden twitching of his own eyelids—"the insects had nothing whatever to do with it." Among other explanations that do not explain, at least so far as Siam is concerned, I would

[1] J. H. Buck, SCIENCE, 81: 339–340, 1935.
[2] T. F. Morrison, SCIENCE, 69: 400–401, 1929.
[3] Philip Laurent, SCIENCE, 45: 44, 1917.

place those that ascribe the phenomenon to puffs of wind, illusion and accident. The most naive of all would seem to be "that complete synchronism in the flashing of a group of fireflies is a very rare accident, occurring when the flashes of individuals chance to come at the same time."[4]

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A CASE FOR PRIORITY IN BOTANICAL NOMENCLATURE

THAT the principle of priority once regarded as the basic rule for determining "validity" or correct "usage" in botanical nomenclature has somehow fallen in disrepute is but natural because of the many individual cases where hewing to the line has resulted in extreme confusion. To-day few deny the practical advantage gained by recognition of *nomina conservanda* in preserving names familiarized through use. It must be recognized, however, that acceptance of a particular *nomen conservandum* without taking account of older recognized homonyms may cause greater confusion than that which it is aimed to correct.

A case in point is a recent proposal by J. E. Dandy[1] that the name *Eriospora* (Hochst. 1851), as used for a genus of 4 or 5 species of Cyperaceae, be accepted by the coming International Botanical Congress as a *nomen conservandum* in place of a synonym, *Catagyna* (Beauv. 1819). This proposal does not take account of the fact that the name *Eriospora* was previously published for a fungus by Berkeley and Broome.[2] The fungus genus *Eriospora,* with only four known species, has a well-defined place in the technical literature. If Mr. Dandy's proposal be accepted at this congress this particular genus of fungi becomes nameless, contributing an added difficulty to the already overcrowded and confused mycological nomenclature —unless, of course, fungi be ruled out of botany, as is proposed by some.

In this era of specialization the taxonomist of seed plants, of ferns, of fungi or of what not, is likely to be familiar only with those genera included in his specialty. It is inevitable, therefore, that a specialist will fail occasionally to realize that his preferred generic name may be preferred also by the student of another group for an entirely different organism. If only the natural interests, preferences and prejudices of the phanerogamists or of the cryptogamists are to be considered each group would favor validating its particular pet name; but neither party desires to invalidate a well-established usage. Accepting either name, however, necessarily invalidates the other. Since both names may have an equally meritorious usage by different groups of distinguished taxonomists and there is no adequate means for obtaining a fair judgment as to which usage is the more desirable the two points of view are patently irreconcilable without recourse to priority. In view of these considerations it would seem that wherever homonyms have both attained a well-established usage we must hew to the line of priority in nomenclature if we would avoid useless and endless confusion.

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ACUITY OF HEARING

THIS laboratory has recently reported a study of performance following the noon meal at tests primarily of mental functions.[1] This work indicated that early afternoon sluggishness among mental workers is probably a form of drowsiness, related to the shift of blood to the splanchnic region following a meal. The sluggishness was most when a heavy meal was eaten at noon, and was least when a dairy lunch of a common cereal, such as corn flakes, was eaten.

Further data, of considerable importance to acoustical workers, are now available. The lower auditory threshold for a tone of 256 cycles on the Western Electric 2A audiometer was determined for seven healthy young men within half an hour after they had finished their noon meal. All these subjects showed a dulling of their sense of hearing after they had eaten their noon meal.

This dulling was greatest on the days when they had eaten a heavy noon meal, the average minimum intensity which was audible being 7.0 decibels on the heavy meal days. On the days when the cereal lunch was eaten, the same men averaged 4.5 decibels as their threshold intensity. This is a difference of 35.7 per cent. greater acuity on the cereal meal days.

Oculists tell me they notice a similar dulling of visual acuity when eye examinations are made after a heavy meal. It is possible, also, that the senses of touch may be dulled after a heavy meal, since it is known that blood is then drawn from the skin to assist in the processes of digestion. The change in acuity of hearing, however, may likely be due as much to the relatively anemic condition of the brain following a heavy meal as it is to an alteration in the circulation to the inner ear itself.

This interesting and unexpected phenomenon associated with hemastatics not only throws light on some of the diurnal variations in human performance,[2] but

[4] Frank C. Gates, SCIENCE, 46: 314, 1917.

[1] *Kew Bull. Misc. Inform.*, No. 2, p. 83, 1935.

[2] *Ann. and Mag. Nat. Hist.*, Ser. 2, 5: p. 455, 1850.

[1] D. A. Laird, H. Drexel, D. DeLand, K. Reimer, "Early Afternoon Sluggishness." Proceedings of the National Office Management Association, June 4, 1935.

[2] G. L. Freeman, "Diurnal Variations in Performance and Energy Expenditure." Northwestern University Press, Chicago, 1935.

also suggests that the salesman who has a noisy used automobile to demonstrate could make the noise appear less if he took the prospect out in it after his big meal of the day. This may also explain why dinner orchestras seem to favor volume to melody, but I doubt if this gives an esthetic justification for their choice of volume.

The practical acoustical worker can quickly verify the data which have been reported, and they would indicate that he will get finer measurements when the ear is used if he has eaten wisely rather than too well.

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TETRAPODS IN THE DUNKARD SERIES

LITTLE vertebrate material of diagnostic value has been reported previously from the rocks of the Dunkard Series of the Allegheny foothill region. Recently a Carnegie Museum field party, consisting of Eugene Burke, William Moran and the writer, discovered well-preserved tetrapod fossils in Dunkard sediments in seven distinct localities. Two of the collecting sites are located in Pennsylvania, the rest in West Virginia and Ohio. While few of the specimens have been removed from the matrix, the material thus far exposed indicates a diversified fauna of amphibians and reptiles. Several skulls and articulated bones have been uncovered, and it is anticipated that some of this material will prove new to science, while at the same time it may be the means of a more exact correlation of the Dunkard rocks, hitherto correlated on the evidence furnished by fossil plants and insects. It is planned to describe this material at a later date in the publications of the Carnegie Museum.

J. J. BURKE

CARNEGIE MUSEUM, PITTSBURGH, PA.

NOMENCLATURE OF CORPUS LUTEUM HORMONE

DURING the past year the progestational hormone has been isolated from the corpus luteum in pure form and its constitution established. Heretofore two different names have been used for this hormone in the literature (progestin, luteosterone). For the sake of international uniformity we agree to use hereafter in the scientific literature only the name *progesterone* for the pure hormone. As is known, the pure hormone exists in two different forms, one melting at 128° (uncorr.) and the other at 121° (uncorr.). The higher melting form (Compound B of Wintersteiner and Allen (1934)[2] and Compound C of Slotta, Ruschig and Fels (1934)[1]) will be known as α progesterone and the lower melting form (Compound C of Wintersteiner and Allen and Compound D of Slotta, Ruschig and Fels) as β progesterone. We hope that these names will be generally accepted in the scientific literature.

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A. BUTENANDT
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BRESLAU, GERMANY;
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SOCIETIES AND MEETINGS

THE INTERNATIONAL CONGRESS OF PHYSIOLOGY IN LENINGRAD[1]

THE fifteenth International Physiological Congress opened this morning in the central hall of the former Tauride Palace, now Uritsky Palace, after one of the early Bolshevik leaders who was assassinated in the summer of 1918.

In the great square hall, with its flat glass roof and terra cotta walls divided at regular intervals by huge white pillars, the 85-year-old Professor Ivan Petrovich Pavlov, Russia's foremost physiologist, rang a bell from the rostrum as he faced upward of 1,200 delegates from more than thirty countries, and declared the congress open.

Each delegate had earpieces and a little switchboard on his desk which enabled him to hear the speeches instantaneously in French, German, Russian or English, or to listen to the speaker direct in the language he was using. Professor Pavlov, who received a thunderous ovation, spoke with clarity and firmness that belied his age. He stressed the facilities given to the cause of science by the Soviet Government and declared it was the duty of scientists to strive not only for knowledge but for peace and mutual understanding among nations.

In his work, he said, is development toward the application to human beings, especially in cases of insanity, of the knowledge of conditioned reflexes that has been acquired by experiments upon animals. It must never be forgotten, he added, that physiology is not merely an abstract science but is intimately concerned with the functions of the human body, and thus is of vast medical and social importance.

Ivan A. Akulof, secretary of the Central Executive Committee of the U. S. S. R., welcomed the delegates

[1] Special cable to *The New York Times*, dated August 8, reprinted by permission.

[1] K. H. Slotta, H. Ruschig and E. Fels, *Berichte der deutsch. chem. Gesell.*, 67: 1270, 1934.

[2] O. Wintersteiner and W. M. Allen, *Jour. Biol. Chem.*, 107: 321, 1934.

on behalf of the Soviet Government and said that whereas in 1914 there had been twenty-four physiological research centers in Russia with a total personnel of 500, there were 380 centers with a personnel of 5,000. President Kadatsky, of the Leningrad Soviet, and President Karpinsky, of the Academy of Science, also made speeches of welcome.

The principal address of the day was then delivered by Professor Walter B. Cannon, of Harvard, who did not fear to inject what might be termed a political flavor into his scientific discourse. Amid applause he said:

"Nationalism has become intensified until it is tainted with bitter feeling. Creative investigators of high international repute have been degraded and subjected to privations. Our triumphs of the past have not been achieved by the workers of any single nation nor the representatives of any single racial group. As investigators we are inclined to be stanch individualists, but successful research requires a long-lasting program.

"In conditions of turmoil the career of the scientist investigator must be nearly impossible because of the pernicious influence of political adventures and their personal coteries. Governments that prevail under such conditions are parasitic; they make no new contribution of knowledge, but benefit from the knowledge gained by others."

Professor Cannon referred to the difficulties caused for scientists by the world depression, and said the Soviet was giving relatively greater funds for research than any other country in the world. His speech was vociferously applauded.

This afternoon the congress began regular work in the "House of Culture" in what is called the Vigorg section of Leningrad, where five large auditoriums were allotted for the reading of papers, which must be limited to ten minutes and are to be followed by five minutes of free discussion, with no translations.

Every delegate, however, received a full program of subjects in each room, a list of speakers and a précis of their talks. Stenographic reports of the proceedings are to be provided in four languages. The delegates are loud in praise of the arrangements made for them.

There are forty buses and 200 automobiles at their free disposal and the "Culture House" is a veritable museum of physiological exhibits, including models, charts and photographs.

The lectures and discussions in the auditorium will continue to-morrow. Sunday will be a rest day. Monday and on Tuesday morning there will be further lectures and discussions. A plenary session is set for Tuesday afternoon for a speech of Sir Joseph Barcroft, a professor of Cambridge University.

On Wednesday, Thursday and Friday there will be lectures and discussions. Friday night the congress will be transferred to Moscow, where on Saturday there will be a plenary session addressed by Professor Louis Lapicque, of the Sorbonne in Paris, and Professor Ukhtomsky, of Leningrad, who is one of the most picturesque figures of the whole congress. Of aristocratic birth and formerly of high position, Professor Ukhtomsky is full bearded and looks and dresses like a Russian peasant.

There is nothing narrow or nationalist in the Russian attitude. Indeed, Professor Ivan Pavlov, as president of the Congress, announced yesterday that lectures by Russian scientists must be delivered in French, German or English, instead of in their own tongue, to facilitate the communication of Russian work to foreign colleagues. This caused a hardship on some Russian investigators who are not familiar with foreign languages, but increased the liveliness of the ensuing discussions.

From a scientific viewpoint there seems little doubt that a centralized state-supported system of scientific research offers advantages that are lacking in countries that depend mainly upon private generosity or upon universities and hospitals which, however wealthy, have many other calls upon their funds. European investigators have long contrasted their lot with that of those in the United States, where great donations have been placed at the disposal of scientific research. Here even Americans are startled by the possibilities of research work on a national scale.

This applies particularly to such an abstruse science as physiology, in which much of the work done may have small practical value immediately yet where apparently "blind alley" investigation may suddenly reveal knowledge of vast importance to humanity.

For the first time in history the resources of a great state are being placed at the disposal of scientific investigators along paths they choose to follow, whether the results are distant or immediate, negative or successful. All the work done is being followed, coordinated and communicated throughout the country.

Visiting physiologists may in some cases possess better equipment, more competent assistants and greater ease of life but they are much impressed by the value—some are beginning to say the necessity—of national assistance to scientific investigations that must necessarily be prolonged and meticulous and may often bear little apparent fruit for a long period.

One of the effects of the congress is expected to be a strongly-reinforced demand of scientific bodies abroad for public funds to aid research and to disseminate the knowledge acquired.

Another thing that impressed the visitors is the re-

spect paid to science and scientists in the Soviet Union. Most of them were surprised by the warmth of their reception and by the fact that for the first time in the case of any visiting bourgeois group, except Ministers of State, there was a reception for the delegates of this congress within the exclusive ramparts of the Kremlin in Moscow.

WALTER DURANTY

SPECIAL ARTICLES

CRYSTALLINE PROGESTIN AND INHIBITION OF UTERINE MOTILITY IN VIVO[1]

SEVERAL years ago we[2] showed that the injection of progestin-containing extracts of the corpus luteum into post-partum rabbits caused complete suppression of the rhythmical uterine contractions usually found at that time, and also that the injection of oestrin into castrated rabbits while under the influence of corpus luteum extracts failed to induce oestrous motility. We were unable at that time to say whether the inhibitory effect of the extracts was due to the progestin or to some other hormone, since no attempt was made to study any fractions other than those known to contain progestin.

During the past year progestin has been isolated in crystalline form and its formula and structure determined.[3] Consequently, we have studied the effect of the pure hormone on uterine motility *in vivo* to determine whether or not it retains the motility-inhibiting factor which we have already shown to be present in the impure progestin-containing extracts.

The experiments were carried out in adult female rabbits whose sexual maturity was proved in most instances by the birth of one litter of young and in the remaining cases by ovulation following a single injection of pregnancy urine. Such animals were castrated and a uterine fistula prepared by transecting the vagina just below the cervix, closing the lower end and bringing the upper end through an opening in the anterior abdominal wall, where it was sutured to the edges of a small opening in the skin.[4] Several days after this operation they were given 100 rat units of Theelin, half intravenously and half intramuscularly to induce oestrous motility. Such injections have to be made because castrated animals such as these exhibit almost no spontaneous motility *per se*. The day after the Theelin was given a small rubber balloon was inserted without anesthesia into one cornu of the uterus and connected through a suitable air-water apparatus to a kymograph in such a way that the spontaneous uterine contractions could be recorded. A continuous record was then made of the oestrous type contractions for about one half hour. Progestin was next injected subcutaneously and the recording continued without interruption for 4 to 5 hours or until complete suppression of uterine motility had taken place (less than 1 hour with the larger doses).

Three different progestin preparations were used: The first was moderately pure (1 rabbit unit = 40 mgs) and the other two were crystalline, one the needle form and the other the prism form. (Progestin occurs in two polymorphous forms.) Both types of crystals gave combustion figures indicating the formula $C_{21}H_{30}O_2$, absorption spectra with a maximum at 240 mμ, and both had the same physiological potency when assayed by the Corner-Allen test for progestin.

We found that the impure extract caused complete suppression of uterine motility within 1 hour after injection when 1.2 rabbit units were given, 2 hours with 0.6 units and 4 hours with 0.3 units. Using the prisms, inhibition was obtained in 3¾ hours from 0.2 rabbit unit (0.26 mg) and in 2½ hours from 0.4 unit. Similar results were obtained when the other type (long needles) were injected.

These results indicate that there is no difference physiologically between the two forms of crystals, either form being capable of suppressing uterine motility, and further, since the pure hormone possesses the same inhibition capacity per rabbit unit as an impure extract, it is evident that both reactions, *i.e.*, inhibition of motility and progestational proliferation of the endometrium, are brought about by action of one and the same hormone.

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SAMUEL R. M. REYNOLDS
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[1] Aided by a grant from the Therapeutic Research Committee of the American Medical Association.

[2] S. R. M. Reynolds and W. M. Allen, *Am. Jour. Physiol.*, 102: 39, 1932.

[3] O. Wintersteiner and W. M. Allen, *Jour. Biol. Chem.*, 107: 321, 1934; A. Butenandt and U. Westphal, *Berichte*, 67: 1440, 1934; M. Hartmann and A. Wettstein, *Helv.*, 17: 878, 1934; K. H. Slotta, H. Ruschig and E. Fels, *Berichte*, 67: 1270, 1934.

[4] S. R. M. Reynolds, *Am. Jour. Physiol.*, 92: 420, 1930.

A COLLOIDAL DYE EFFECTIVE IN TREATING PERNICIOUS ANEMIA AND EVOKING RETICULOCYTOSIS IN GUINEA PIGS[1]

WE have confirmed the observation of Massa and Zolezzi[2] that the intravenous injection of repeated

[1] From the Department of Medicine, Stanford University School of Medicine, San Francisco, California.

[2] M. Massa and G. Zolezzi, *Klin. Wochnschr.*, 14: 235, 1935.

doses of the mono-azo dye, Congo Red, produces effects quite similar to those of liver extract in cases of primary anemia. Our observations were made on two cases of untreated but mild Addisonian anemia, using intravenous injections of 1.5 per cent. Congo Red 4B in 6 per cent. dextrose. One patient received 60 ccm in five days, the other 90 ccm in ten days; both had a rise in reticulocytes and a fall in serum bilirubin comparable to that produced in similar cases by intramuscular injections of liver extract. Massa and Zolezzi continued treatment until blood regeneration was complete in nine of the fourteen cases which responded to Congo Red, but we felt that liver therapy was less troublesome to administer for continuous management.

Many normal guinea pigs exhibit a slightly delayed but sharp and sustained reticulocyte shower, following injection of liver extracts known to be potent in pernicious anemia. This response seems specific for the liver fractions valuable in therapy.[3,4] Congo Red injected daily for five days into the peritoneal space of guinea pigs produced a reticulocyte shower, maximal from 5 to 7 days after beginning treatment with 30 mgm of dye per pig daily. The reticulocytosis declined gradually, reaching the control level from 10 to 14 days after the peak. At that time large doses of potent liver extract were injected, but caused no further reticulocyte response. Congo Red not only produces the same effect on normal guinea pigs as potent liver extract, but the treatment, like that with liver, renders the animals refractory to liver therapy for a considerable period of time.

These results of injecting a mono-azo dye with colloidal properties can scarcely be accounted for by the widely current theory that pernicious anemia is cured, and the reticulocyte response of guinea pigs evoked, by providing a substance needed for the maturation of red corpuscles. Massa and Zolezzi[5] suggest that the dye prevents hemolysis by blocking reticulo-endothelial cells. While the theory that pernicious anemia results from over-active blood destruction and can be corrected by blocking the reticulo-endothelial system might be satisfactory to account for the blood disturbances of Addisonian anemia, it obviously fails to account for the glossitis and spinal cord lesions which often accompany the disease and are arrested by liver therapy. Congo Red is notably effective in neutralizing toxic substances (curare, strychnine, diphtheria and tetanus toxins) and it is more probable that in pernicious anemia and in normal guinea pigs it assists in detoxification of substances, probably enterogenous in origin, which are hemolytic. These observations make imperative a further exploration of the old theory that pernicious anemia is due to excessive absorption or deficient detoxification of noxious substances derived from the gastro-intestinal tract. While it is not improbable that the effective factors in liver are utilized in the detoxification of a toxin, it seems highly unlikely that Congo Red can supply material needed for production or maturation of red cells or for maintenance of neurones and lingual papillae.

CAMILLE MERMOD
WILLIAM DOCK

[3] B. M. Jacobson, SCIENCE, 80: 211, 1934.
[4] Y. Subbarow, B. M. Jacobson and C. H. Fiske, *New Eng. Med. and Surg. Jour.*, 212: 663, 1935.
[5] M. Massa and G. Zolezzi, *Gior. Clin. Med.*, 14: 1207, 1933.

DEUTERIUM AS AN INDICATOR IN THE STUDY OF INTERMEDIARY METABOLISM

MANY attempts have been made to label physiological substances by the introduction of easily detectable groups such as halogens and benzene nuclei. However, the physical and chemical properties of the resulting compounds differ so markedly from those of their natural analogues that they are treated differently by the organism. The interpretation of metabolic experiments involving such substances is therefore strictly limited.

We have found the hydrogen isotope deuterium to be a valuable indicator for this purpose. The fact that it occurs in the same proportion (1 atom of deuterium to 5,000 atoms of protium) in the hydrogen of ordinary water and of organic matter is in itself evidence that the living body is unable to distinguish the few organic molecules which contain deuterium from those which do not. Were the reverse the case, organic matter of biological origin would display differences in isotopic ratio.

We have prepared several physiological compounds (fatty acids and sterol derivatives) containing one or more deuterium atoms linked to carbon, as in methyl or methylene groups. Their physical properties are indistinguishable from those of their naturally occurring analogues by the methods commonly employed. As, however, the deuterium content of these substances or of their physiological derivatives can readily be determined from the properties of the water formed on combustion, their fate in the body can be followed even after considerable dilution.

In preliminary feeding experiments with different amounts of fat (linseed oil, partially hydrogenated with deuterium; the product had similar properties to olive oil) to mice, it was found that most of the fat, before being utilized, is stored in the fat depots; the fat burned in the body was not taken directly from that absorbed but from the fatty tissue.

The breakdown of the fat in the organism could be followed by deuterium analysis of the body fluids, since organic compounds containing deuterium, when burned, form an equivalent amount of heavy water. This is equally distributed in all body fluids. For example, after feeding mice for four days on a diet rich in carbohydrate with only 1 per cent. of fat, 60 per cent. of the absorbed fat could be recovered from the fat depots, and in the body fluids an amount of heavy water equivalent to 20 per cent. of the fat was found. In order to prevent an excessive storage of food material the total food intake was so limited that the animals lost weight during the feeding period.

The use of deuterium has made possible, for the first time, the recognition of cholestenone and coprostanone as intermediates in cholesterol metabolism. Earlier experiments with dogs have shown that administration of cholestenone gives rise to an excess excretion of either cholesterol or coprosterol, according to the nature of the basal diet. We have now found that ingested coprostanone is converted into coprosterol; after feeding coprostanone 4,5-d_2 to a dog and to a human the coprosterol isolated from the stools contained large amounts of deuterium.

The number of possible applications of this method appears to be almost unlimited.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A BIOLOGICAL EFFECT OF IONIZED AIR

IN view of the contradictory results of certain experiments[1] designed to test the therapeutic and other biological value of ionized air, it has been thought desirable to try some simple experiment under well-controlled conditions which would give a definite answer to the question whether or not ionized air has any effect on living material. Accordingly, inbred cultures of wild-type *Drosophila melanogaster* have been grown in ionized air under various conditions.

In the first set of experiments ionized air was drawn through the culture bottle, which was closed by a rubber stopper. The air was ionized by a polonium source suspended in a glass tube, one end of which was closed with a wad of cotton, the other end leading without obstruction to the culture bottle. Since the source was never closer than 30 cm to the bottle, the weak gamma-radiation characteristic of polonium need not be considered. These experiments were performed in a damp, cool basement.

In a second series of experiments, performed in various rooms in another building, air was ionized in the culture bottles by means of a brush discharge between point and plane connected to a 5,000 volt transformer, each bottle being closed with a wad of cotton. In this case, as indeed in the previous one, the degree of ionization would vary at different points within the bottle, because of recombination of ions.

Each culture was started with flies from the inbred stock; neither these nor any of their ancestors had in any case been exposed in the experimental bottles, but exposure to highly ionized air was started within ten minutes after each culture was prepared. In the polonium experiments exposure was continuous, but in the second series exposure was stopped by turning off the current during about half of each day.

In both series of experiments a definite effect has been observed, consisting in the coloration and subsequent death of larvae. The coloration, reddish brown or rusty, appeared first at the posterior spiracles, and spread from this point through the larval body. The amount of coloration when death occurred was not uniform; the majority of affected larvae died when about half of the body was colored, although a few lived until coloration was practically complete, and many died with only a spot of color at the spiracles. Coloration did not advance after death.

Coloration never appeared in all larvae in a culture; it was not observed in larvae that remained in or upon the food medium at the bottom of the bottle, but only in those that crawled up the walls. Some larvae were colored in every bottle treated, and in several cases the majority of those on the walls. Once coloration set in, death of the affected larva followed within twelve to twenty-four hours. Within another day or two all larvae that could be seen in the bottle died. The adult flies remained alive, although in the second series, with the discharge, the adults showed an extreme debility, being scarcely able to crawl around after an exposure of two days or more.

That death of the larvae was not caused by a poisoning or other change in the food was proved in the following manner: A culture in which after exposure to ionized air all larvae that could be seen had died was allowed to stand filled with normal atmospheric air. Within two days larvae appeared, and seemed active and normal. None of these larvae were colored.

[1] Asperen, *Ann. Botany*, 44: 176, 989; Chouchak, *Rev. Gen. Bot.*, 41: 488, 465, 1929; Belak, Holik and St. Kelemen, *Zeitschr. Hyg. u. Infektionskrankh.*, 111: 5, 703, 1930. See also: Koller, *Jour. Franklin Inst.*, 214: 5, 543, 1932; Romanoff, SCIENCE, 81: 536, 1935.

Histological examination has failed to show any significant difference between the colored and normal larvae. In every case control cultures were grown from the same stock and on food from the same supply, and none of the controls showed coloration or any other apparent deviation from normal.

Although the temperature in the discharge may have risen slightly, the temperature of the air throughout the bottle was not appreciably raised. In the polonium experiments no heating was possible. Also, while ozone and oxides of nitrogen are produced in a discharge, very little of either could have been present during the polonium experiments.

Flies from the same stock were treated by placing cultures in a drying oven at 33° C., and others in a desiccator containing calcium chloride. Although after several days all larvae in these cultures died, no coloration was apparent.

It would thus appear that ionized air is capable of producing an effect on living material.

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APPLICATIONS OF PERVAPORATION

PERVAPORATION was discovered by Kober[1] in 1917, to whom we owe most of the information regarding its usefulness. Holmes[2,3] briefly outlines the method and its uses. Outside of these references the method appears to have been practically entirely overlooked. Since it has proved so efficient in this laboratory, it was felt that this very useful procedure should be brought to the attention of other workers.

The apparatus used by the writer is illustrated in Fig. 1. The figure is self-explanatory. Cellophane casing is used instead of the collodion membrane described in the original paper; the fresh casing should be soaked in distilled water for a few hours before use.

The apparatus has been successfully employed by the writer for the concentration of very dilute protein solutions with the simultaneous removal of salts and for the concentration of aqueous and aqueous-glycerol solutions of enzymes. The rate of concentration of glycerol solutions is, however, considerably slower, and more frequent washing of the bag is necessary to remove the glycerol from the outside.

Large quantities of water can be evaporated in a relatively short time at room temperature or even slightly below this. For example, using a bag 18″ x 3″, approximately 1 liter of water per 24 hours was removed, the average temperature inside the bag being 20° C.

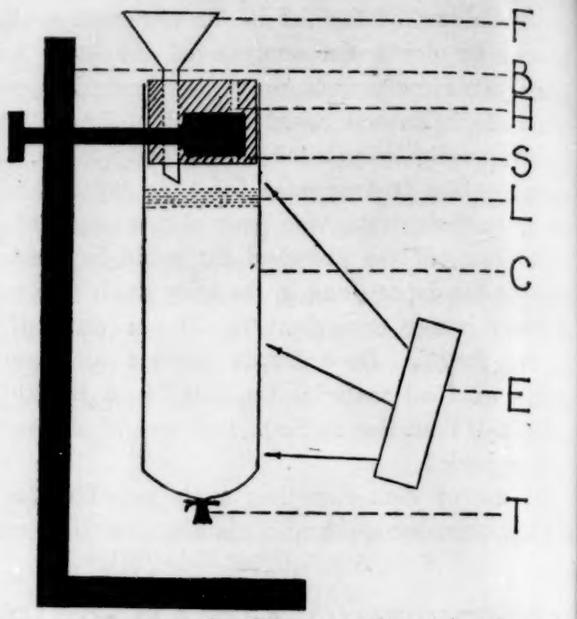

FIG. 1. Apparatus for Pervaporation. A, air vent; B, burette stand; C, Cellophane casing; E, electric fan; F, funnel; L, layer of toluene; S, rubber stopper; T, tied end of bag, dipped in paraffin.

The advantages of pervaporation are the simplicity of the necessary apparatus, the ease of manipulation and the little attention required during the operation. All that needs to be done is to refill the bag from time to time and to wash off its outside. In addition operations can be carried out under sterile conditions, and with a battery of pervaporators to take care of very large volumes of liquid.

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[1] Kober, *Jour. Am. Chem. Soc.*, 39: 944, 1917.

[2] Holmes, "Introductory Colloid Chemistry," 3rd Ed., p. 18, John Wiley and Sons, Inc., New York, 1934.

[3] Holmes, "Laboratory Manual of Colloid Chemistry," 2nd Ed., p. 30, John Wiley and Sons, Inc., New York, 1928.

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